BIOTIC COMMUNITY

Fish Community

Fish Sampling

Since 1941, the fish communities at 48 localities in the Cuivre River Basin have been studied. Ten sites were surveyed in 1941, 13 from 1962 to 1967, 15 from 1978 to 1979 and 25 from 1986 to 1991 (Table 13, Figure fs). A total of 71 samples were collected. Collection data were summarized by time period. Time period I included the oldest collections, those made prior to 1946; time period II include samples taken from 1946 to 1970; and time period III or recent collections are those made after 1970. Fourteen sits were sampled in two or more time periods. In addition, creel survey data were collected by telephone from 1983 to 1988 (A. S. Weithman, MDC, unpublished).

In 69 of the 71 fish community samples, fish were captured with seines. Electrofishing equipment was used at three sites: site 4 in 1962 and sites 44 and 47 in 1990, in conjunction with seining. Only electrofishing equipment was used at site 48, on the Cuivre River in 1991. A fish toxicant was used once in conjunction with seining, at site 37 in 1967. Fisheries Management District 4 staff used seines with the following dimensions when making collections from 1989 to 1990; 6-by-4 feet with 1/8-inch mesh, 15-by-6 feet with 1/4-inch mesh and 25-by-8 feet with 1/4-inch mesh. A summary of seine sizes and other gear used at each site during this period (1989-1990) is given in Appendix B, Table 1. Seines were generally pulled through habitat types in an upstream direction or held around cover that was then disturbed to scare fish into the net. When the 1/8-inch mesh seine was used in riffles, it was held stationary and the substrate upstream from it was disturbed. At least two riffle/pool sequences were sampled at each site. The number of seine hauls at each site varied. Seining continued until a gallon jar of specimens was collected or no new species were observed. Large fish were identified and enumerated in the laboratory.

Fish Distribution

Seventy-one different fish species have been observed in the basin since the 1940s (Table 14). Investigators surveying the fish population collected 47 species in period I, 54 species in period II and 62 species in period III; altogether, 66 different species were observed. In addition, five other species were reported caught by anglers (A. S. Weithman, MDC, unpublished data), collected by Cuivre River State Park personnel (and verified) or were among dead fish observed in the Cuivre River after a major fish kill during 1992 (Duchrow 1992b). Fish distribution maps for each species collected by Fisheries Management staff, state park personnel (only one species) and earlier investigators are included in Appendix B. Distribution data obtained from the creel surveys and 1992 fish kill were not included because the original location of the fish could not be determined.

Fish fauna of the Cuivre River Basin is transitional in nature, having high proportions of Ozark and Prairie species. On the mainstem of the Cuivre River, 29 fish species were collected in period III. According to the faunal region classification of species as developed by Pflieger (1971), they could be described as 22% Prairie, 29% Wide-ranging, 20% Ozark, 10% Big River, 10% Ozark-Prairie, 6% Lowland and 2% Ozark-Lowland (Figure 14). In terms of numbers of fish represented in samples, Prairie fish accounted for 73% of all fish collected in the Cuivre River mainstem. The samples, however,

were dominated by one extremely abundant Prairie species, the red shiner. It accounted for 66% of all fish caught in the mainstem. The red shiner is particularly tolerant of high turbidity and silty conditions which are typical of this section of the river.

The fish fauna of the Big Creek and Sugar Creek drainages, tributaries entering the Cuivre River downstream of the confluence of the West Fork and North Fork Cuivre rivers, differs from the mainstem by favoring Ozark species (Figure 14). In these tributaries, no one species totally dominates in abundance. Habitat conditions consisting of rocky substrates, clear water and cooler water temperatures support fish like the bigeye shiner, orangethroat darter, steelcolor shiner and striped shiner.

On the West Fork and North Fork Cuivre River drainages, numbers of Ozark and Prairie species are similarly represented; 29% and 31% were Ozark and 20% and 23% were Prairie, respectively in these streams. This subbasin differed in the relative abundance of fish present. The West Fork had numerous wide-ranging fish and fewer Prairie fish while the North Fork had high numbers of Prairie fish and few Wide-ranging fish (Figure 15). In the West Fork no one species was strongly dominant, but in the North Fork the red shiner was extremely abundant. It accounted for 42% of the fish in the North Fork collections while contributing only 15% to the West Fork collections.

Basin-wide, the green sunfish was the most widely distributed fish in period III samples. It was observed at 98% of the 40 sites surveyed. The next most widespread fish were the orangethroat darter (88%), bluntnose minnow (88%), red shiner (85%) and redfin shiner (85%). Pflieger (1971) indicated that the green sunfish and bluntnose minnow were among ubiquitous fish in the state. The most abundant fish, the red shiner, accounted for 25% of the 37,177 fish collected in recent samples. It was followed in abundance by the redfin shiner (12%), bluntnose minnow (11%), bigeye shiner (9%) and orangethroat darter (6%).

Ten new species were found in the basin after 1970 (Appendix B, contact authors for Appendix B information). Seven of these species-- brook silverside, skipjack herring, silver chub, mimic shiner, bigmouth buffalo, stonecat and freckled madtom--were collected by field investigators from the larger reaches (fourth-order-and-larger) of the Cuivre River or its major tributaries. Two species-- northern pike and bighead carp --were observed in 1992 among dead fish after a major fish kill on the Cuivre River. One species, pirate perch, was collected by State Park personnel while sampling Little Sugar Creek in 1983. The bighead carp is an exotic species from China that has recently been found in Missouri. Observations of the brook silverside and mimic shiner represent extensions in range from that reported by Pflieger (1975).

Although less dramatic, the steelcolor shiner, bluegill, mosquitofish, quillback, northern studfish and bullhead minnow appear to be more widespread than in the past (Appendix B, contact authors for Appendix B information). The increased prevalence of the bluegill and mosquitofish , quillback , northern studfish and bullhead minnow appear to be more widespread than in the past (Appendix B). The increased prevalence of the bluegill and mosquitofish is probably partly due to their introduction into ponds and sewage lagoons. The golden redhorse , blackside darter and white sucker appear to be less widespread than in the past (Appendix B).

Intolerant Species

Twenty-six intolerant species, species ver sensitive to changes in environmental condition, have been observed in the Cuivre River Basin (Table 14; W. L. Pflieger, MDC, unpublished data). Streams supporting the highest proportion of intolerant species during period III were the West Fork Cuivre River (38%), Sandy Creek (37%), North Fork Cuivre River (32%), Cuivre River (31%) and Bear Creek (30%) (Table 15). Streams showing the greatest number of intolerant species missing in period III (but found in period I or II) were Lead Creek and tributaries (6), Big Creek and tributaries (3), Mill Creek (3) and Elkhorn Creek (3) (Table 15). The disappearance of intolerant species from streams suggests a deterioration of their habitat quality. In addition, the Big Creek drainage also has two intolerant species of unknown status; the southern redbelly dace and banded sculpin were last found in period II but the areas where these fish were collected were not resampled in period III.

The ghost shiner, a species on the state watch list (a watch list designation is defined as not currently rare or endangered, but has a restricted distribution or has experienced sufficient decline to indicate it may soon become rare or endangered [MDC 1991a]), was found at nine sites along the mainstem portions of the Cuivre, the North Cuivre River and the West Fork Cuivre rivers, at or near localities where they were previously collected (Appendix B). During period III, the bluntnose darter and highfin carpsucker maybe have become extirpated in the basin (Table 15, Appendix B; contact authors for Table 15 information). They were not recollected in areas where they were previously observed (Appendix B). Pflieger (1975) indicated that these species have been declining in abundance for years.

Sportfish

Anglers can pursue eight species of game fish and a variety of other sport fish in the Cuivre River Basin. Game fish include smallmouth bass, largemouth bass, channel catfish, flathead catfish, black crappie, white crappie, walleye and white bass. Bluegill, common carp, freshwater drum and green sunfish are the most commonly sought after non-game fish. Black bass (largemouth and smallmouth bass) were widely distributed, occurring in nearly all major streams sampled (Appendix B). Channel catfish and crappie were less commonly found. However, they probably do occur in most streams with permanent pools of water. Flathead catfish and white bass were only collected from Cuivre River (Appendix B). No single game fish exceeded 1% of the total number of fish collected. This low estimate of abundance is not unusual for large fish such as them because they are not fully vulnerable to capture in a seine as adults. Walleye were not collected by field investigators in Cuivre River but were caught by fishermen during creel surveys. Walleye are found in the upper Mississippi River and probably travel up into the Cuivre River.

From 1983 to 1988, the Cuivre River annually supported an estimated 9,276 to 25,128 fishing trips. During this period, catfish were the most sought-after species by anglers. Catfish anglers accounted for 43% of all hours fished. On average 10,493 catfish, 8,905 sunfish, 3,561 crappie, 1,773 bass, 1,766 common carp, 1619 freshwater drum, 328 white bass and 79 walleye were harvested each year. The overall quality of the fishery was rated as fair by anglers (A. S. Weithman, MDC, unpublished data).

Fish Stockings

Grass carp, bluegill, largemouth bass, crappie, redear sunfish, channel catfish and mosquitofish often are stocked in lakes, sewage lagoons and ponds within the basin and probably enter streams during periods of high precipitation. Bait bucket releases also occur into streams.

Fishing Regulations

Statewide fishing regulations apply to all streams in the basin. Special regulations (3CSR10-4.115) apply to fishing in public lakes managed by the MDC (see current Wildlife Code for more detail).

Aquatic Invertebrates

Mussels

Sixteen mussel species are found in the Cuivre River Basin (Table 16; Oesch 1984; A. C. Buchanan, MDC, personal communication). Most species are commonly found; however, one species, the hickorynut, is on the state watch list. Although the streams in the basin are not open for commercial harvest operations, they do contain seven species--the mapleleaf, pimpleback, threeridge, Wagbash pigtoe, mucket, yellow sandshell and pocketbook--which are commercially important. Their shells may be used in the bottom, pearl or polished chip industry.

Native mussel populations may become threatened in the future if the zebra mussel, *Dreissena polymorpha*, a harmful European mussel recently detected in the Missouri portion of the Mississippi River, becomes overly abundant. This mussel is prolific and has the ability to adhere to almost any firm substrate and clog or smother objects. It could damage native mussel populations, water intakes, boat motors, aquatic habitats and the aquatic food chain (it removes significant amounts of phytoplankton from the water).

Crayfish

Five species of crayfish--northern crayfish (*Orconectes virilis*), golden crayfish (*Orconectes luteus*), papershell crayfish (Orconectes immunis), prairie crayfish, (*Procambarus gracilis*) and devil crayfish (*Cambarus diogenes*)--are found in the Cuivre River Basin (Pflieger 1987). The northern, golden and papershell crayfishes are primarily aquatic, while the prairie and devil crayfishes live on land in burrows. Northern and golden crayfish were incidentally captured in our seine in our seine collections of stream fish. Crayfish distribution information from fisheries management personnel (Fisheries District 4, MDC, unpublished data) and Pflieger's collection (W. L. Pflieger, MDC, unpublished data) is summarized in Appendix C (contact authors for information from Appendix C).

Aquatic Insects

Benthic invertebrates of the Cuivre drainage were studied by Duchrow (1974) to evaluate the effects of pollution and water quality. He collected invertebrate samples in 1969 and 1970 at 17 locations in the basin including the Cuivre River, Big Creek, North Fork Cuivre River, Sulphur Creek, Indian Creek, West Fork Cuivre River, Lead Creek, Elkhorn Creek, White Oak Creek and Hickory Creek. Duchrow used a species diversity index, "d", described by Wilhm (1967) and found that benthic invertebrate species diversity was low ("d" usually less than 3.0) and silt-intolerant species often were absent. He concluded that these conditions implied pollution. Siltation, organic pollution from agricultural operations and municipal sewage discharges were indicated as major problems in the basin.

Threatened and Endangered Species

Sixteen sensitive plant and animal species are found in the Cuivre River Basin (Bogler and Nigh) 1986; MDC 1991a; MDC 1991b; Fisheries District 4, MDC, unpublished data; Reese 1986; J. Meyer, MDC, personal communication; A.C. Buchanan, MDC, personal communication; Table 11, contact

authors for information from Table 11). The auriculate false foxglove (*Tomanthera auriculata*) is rare within the state and is candidate for federal listing. Of the remaining species, the black huckleberry and thread-like naiad are considered endangered within the state. Other Missouri rare species include the greater prairie chicken, four-toed salamander, star duckweed, wild sarsaparilla and prairie dandelion. Six species--the river otter, ringed salamander, ghost shiner, hickorynut mussel, heart-leaf plantain and adder's tongue fern--are on the Missouri watch list. Two plants, American pillwort fern and lance-like spike rush have undetermined status due to insufficient information. Five of the ten sensitive plants - American pillwort fern, heart-leaf plantain, lance-like spike rush, star duckweed and thread-like naiad require high moisture environments for their survival. They live in very damp areas or in water. The ghost shiner (watch list) is found in large rivers. It was recently observed in the mainstem of the Cuivre River, North Fork Cuivre and West Fork Cuivre rivers, (Appendix B, contact authors for information from Appendix B). The hickory mussel was observed by Buchanan (1992) in Cuivre River.

The river otter was reintroduced into the Cuivre River Basin as part of a statewide otter restoration project begun in 1982 (J. Meyer, MDC, personal communication). During 1986, 22 otters were released in the West Fork Cuivre River just north of Truxton and 23 otters were released in Argent Slough near the mouth of Cuivre River. The release program has been considered successful in Missouri. The status of the river otter has been declassified from rare in the early 1980s to watch list in 1991.

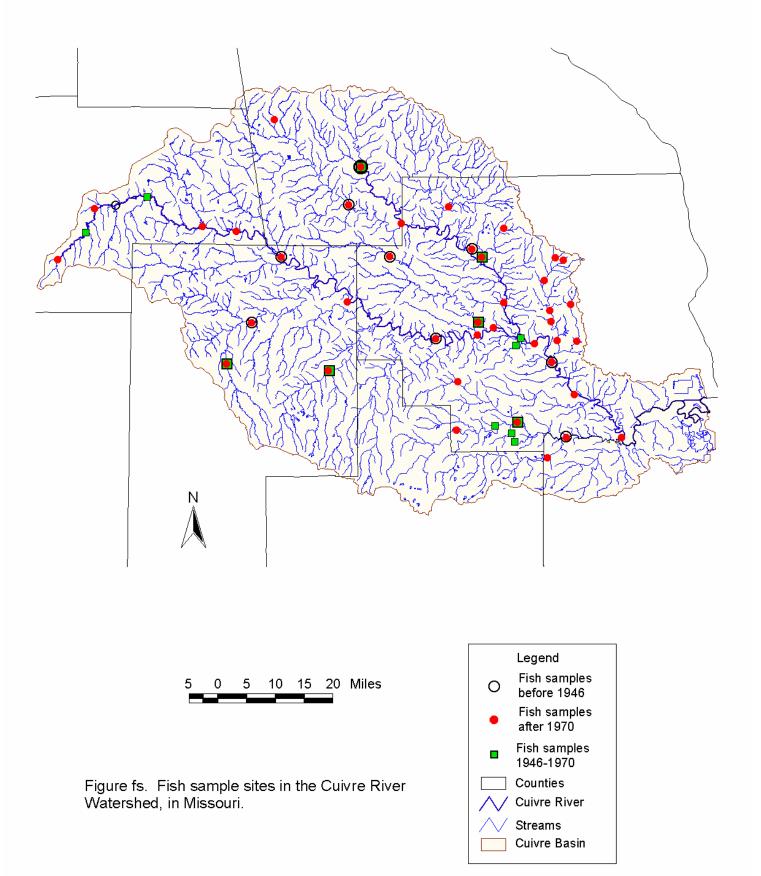


Table 13. Fish sampling sites in the Cuivre River Basin (W. L. Pflieger, MDC, unpublished data; Fisheries District 4, MDC, unpublished data).

Site Number	Stream Name	River Mile	Pflieger Locality	Fish Mgmt. Code	Year(s) Sampled
Cuivre Rive	r				
1	Cuivre River	21.0	1922C	-	1979
2	"	27.0	0776A	G90-11	1941, 1990
3	"	31.5	-	G90-10	1990
4	"	32.4	0847B ^a	-	1962
48	"	11.0	-	G91-1 ^b	1991
5	Big Creek	5.6	0777A	G90-9	1941, 1990
6	"	12.2	0844B	G90-1 G90-22	1962,1990
7	Unnamed trib. to Big Creek	1.0	0845B	-	1962
8	Unnamed trib. to Big Creek	1.0	0843B	-	1962
9	Big Creek	13.6	0846B	-	1963
10	"	19.5	-	G90-14	1990
11	Indian Camp Creek	3.0	1759C	-	1978
12	Coon Creek	5.2	-	G90-13	1990
13	Little Sugar Creek	1.3	-	G89-2	1989
14	"	6.2	-	G89-3	1989
15	Sugar Creek	1.5	1848C	-	1979
16	"	6.0	1849C	-	1979
17	"	7.0	1850C	-	1979
18	"	9.0	1851C	-	1979
19	Unnamed trib. to Sugar Creek	1.0	1852C	-	1979
20	Unnamed trib. to Sugar Creek	1.0	1853C	-	1979
21	Spring Creek	2.0	0848B	-	1962
22	North Fork Cuivre River	4.5	-	G90-18	1990

Table 13 continued

Table 10 c	orianaea				
23	"	11.4	0770A	G90-15	1941,1990
24	"	24.0	-	G90-16	1990
25	"	32.5	0768A	G90-6	1941, 1962
			0768B	G90-19	1990
26	Mill Creek	0.6	0850B	G89-4	1962, 1989
27	"	4.0	-	G89-1	1989
28	Sandy Creek	1.0	1924C	-	1979
29	Indian Creek	8.4	0769C	G90-5	1941, 1990
30	"	21.9	2102C	-	1986
West Fork	Cuivre River				
31	West Fork Cuivre River	2.3	-	G89-5 G90-21	1989,1990
32	"	6.0	1923C	-	1979
33	"	11.8	0775A	G90-12	1941,1990
34	"	28.4	1907C	-	1979
35	"	39.1	0773A	G90-17	1941, 1990
36	"	45.9	1906C	-	1979
37	"	49.4	0842 ^d	-	1967
38	"	59.3	1905C	-	1979
39	"	62.6	0772A	-	1941
40	"	66.0	1904C	-	1979
41	West Fork Cuivre River	68.8	0841B	-	1967
42	"	74.7	1903C	-	1979
43	Lead Creek	3.5	0849B	G90-8 G90-20	1962,1990
44	Big Lead Creek	4.6	0771A	G90-7 G90-26 ^a	1941, 1990
45	Bear Creek	10.3	0854B	G90-2 G90-23	1967, 1990
46	Elkhorn Creek	11.5	0774C	G90-4 G90-25	1941, 1990
47	"	17.8	0855B	G90-3 G90-24 ^c	1967, 1990

Table 14. Fishes of the Cuivre River Basin.

Common Name	Scientific Name	Classification		
		Distribution	Tolerance	Status
Gars	Lepisosteidae			
Longnose gar	Lepisosteus osseus	Wide		
Shortnose gar	Lepisosteus platostomus	Big		
Herrings	Clupeidae			
Gizzard shad	Dorosoma cepedianum	Wide		
Skipjack herring	Alosa chrysochloris	Big	I	
Minnows	Cyprinidae			
Central stoneroller	Campostoma anomalum	Ozrk-Pr		
Largescale stoneroller	Campostoma oligolepis	Ozrk	I	
Bighead Carp ¹	Hypophthalmicthys nobilis	Big		
Red Shiner	Cyprinella lutrensis	Pr		
Steelcolor shiner	Cyprinella whipplei	Ozrk	I	
Common Carp	Cyprinus carpio	Wide		
Striped shiner	Luxilus chrysocephalus	Ozrk	I	
Redfin shiner	Lythrurus umbratilis	Wide		
Silver chub	Macro hybopsis storeriana	Big	I	
Golden shiner	Notemigonus crysoleucas	Wide		
Bigeye shiner	Notropis boops	Ozrk	I	
Ghost shiner	Notropis buchanani	Pr	I	WL
Bigmouth shiner	Notropis dorsalis	Pr		
Suckermouth minnow	Phenacobius mirabilis	Pr		

Note: All sites were sampled with seines except where indicated.

^a D.C. electrofishing equipment and seining

^b D.C. electrofishing equipment only

^c Backpack D.C. electrofishing equipment, poor effectiveness, but site was also sampled by seine in same season.

^d Fish toxicant and seining

Table 14 continued

Table 14 Continued	•			
Southern redbelly dace	Phoxinus erythrogaster	Ozrk	I	
Bluntnose minnow	Pimephales notatus	Wide		
Fathead minnow	Pimephales promelas	Pr		
Bullhead minnow	Pimephales vigilax	Low		
Creek chub	Semotilus atromaculatus	Ozrk-Pr		
Hybrid shiner	Cyprinella lutrensis X C. Whipplei			
Hybrid minnow	Notropis dorsalis X s. atromaculatus			
Suckers	Catostomidae			
River carpsucker	Carpiodes carpio	Pr		
Quilback	carpiodes cyprinus	Pr		
Highfin carpsucker	Carpiodes velifer	Ozrk	I	
White sucker	Catostromus commersoni	Ozrk-Pr		
Northern hog sucker	Hypentelium nigricans	Ozrk	I	
Smallmouth buffalo	Ictiobus bubalus	Wide		
Bigmouth buffalo	Ictiobus cyprinellus	Wide		
Silver redhorse	Moxostoma anisurum	Ozrk	I	
Black redhorse	Moxostoma duquesnei	Ozrk	I	
Golden redhorse	Moxostoma erythrurum	Ozrk	I	
Shorthead redhorse	Moxostoma macrolepidotum	Ozrk-Pr		
Catfishes	Ictaluridae			
Black bullhead	Ameiurus melas	Wide		
Yellow bullhead	Ameirus natalis	Wide		
Channel catfish	Ictalurus punctatus	Wide		
Slender madtom	Noturus exilis	Ozrk	I	
Stonecat	Noturus flavus	Pr	I	
Freckled madtom	Noturus nocturnus	Low	I	
Flathead catfish	Pylodictis olivaris	Wide		
Pikes	Esocidae			
Northern pike ¹	Esox lucius	U		

Table 14 continued

Table 14 continued	TI	 		1
Pirate Perches	Aphredoderidae			
Pirate perch ³	Aphredoderus sayanus	Low	I	
Killifishes	Cyprinodontidae			
Northern studfish	Fundulus catenatus	Ozrk		
Blackstripe topminnow	Fundulus notatus	Wide		
Livebearers	Poeciliidae			
Mosquitofish	Gambusia affinis	Low		
Silversides	Atherinidae			
Brook silverside	Labidesthes sicculus	Ozrk-Low	I	
Sculpins	Cottidae			
Banded sculpin	Cottus carolinae	Ozrk	I	
Sea Basses	Percichthyidae			
White bass	Morone chrysops	Big		
Sunfishes	Centrarchidae			
Green sunfish	Lepomis cyanelus	Wide		
Warmouth ²	Lepomis gulosus	Low		
Orangespotted sunfish	Lepomis humillis	Pr		
Bluegill	Lepomis macrochirus	Wide		
Smallmouth bass	Micropterus dolomieu	Ozrk	I	
Largemouth bass	Micropterus salmoides	Wide		
White crappie	Pomoxis annularis	Wide		
Black crappie	Pomoxis nigromaculatus	Wide		
Hybrid sunfish	Lepomis cyanellus X L. macrochirus			
Perches	Percidae			
Bluntnose darter	Etheostoma chlorosomum	Low	I	
Slough darter	Etheostoma gracile	Low	I	
Johnny darter	Etheostoma nigrum	Ozrk-Pr		
Orangethroat darter	Etheostoma spectabile	Ozrk		
Logperch	Percina caprodes	Ozrk	I	

Table 14 continued

Blackside darter	Percina maculata	Pr	I	
Slenderhead darter	Percina phoxocephala	Ozrk-Pr	I	
Walleye ²	Stizostedion vitreum	Wide	I	
Drums	Sciaenidae			
Freshwater drum	Aplodinotus grunniens	Big		

Legend

Big = Big river; Low= Lowland; Pr = Prairie; Ozrk = Ozark; Wide = Wide-ranging; I= Intolerant species;

Table 16. Mussels found in the Cuivre River Basin (Oesch 1984).

Common Name	Scientific Name	Status
Giant floater	Anodonta grandis	
Elktoe	Alasmidonta marginata	
White heelsplitter	Lasmigona c. complanata	
Fluted-shell	Lasmigona costata	
Mapleleaf	Quadrula quadrula	
Pimpleback	Quadrula p. plicata	
Threeridge	Amblema p. plicata	
Wabash pigtoe	Fusconaia flava	
Spike	Elliptio dilatata	
Mucket	Actinonaias ligamentina	
Deertoe	Truncilla truncata	
Fragile papershell	Leptodea frafilis	
Pondmussel	Ligumia subrostrata	
Yellow sandshell	Lampsilis teres	
Hickorynut	Obovaria olivaria	State Watch List
Pocketbook	Lampsilis ovata	

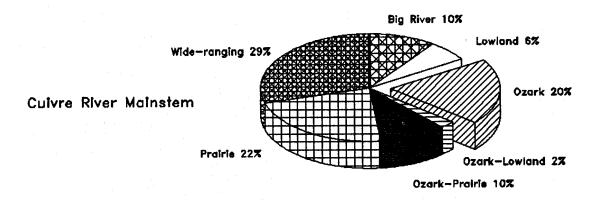
U = Undetermined; WL = on Missouri Watch List of Rare or Endangered Species.

Species observed in 1992 fish kill in Cuivre River (Duchrow 1992b).

Species reported caught by anglers (A. S. Weithman, MDC, unpublished data).

Species caught by Cuivre River State Park personnel in Little Sugar Creek in 1983.

FAUNAL COMPOSITION



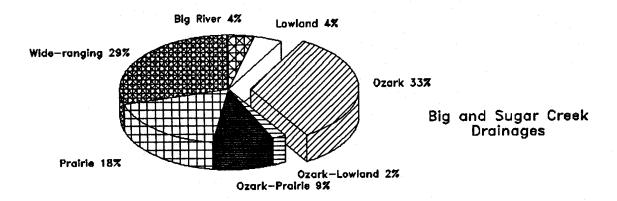


Figure 14. Faunal composition of fish species collected from the Cuivre River subbasin, 1971 to 1991.

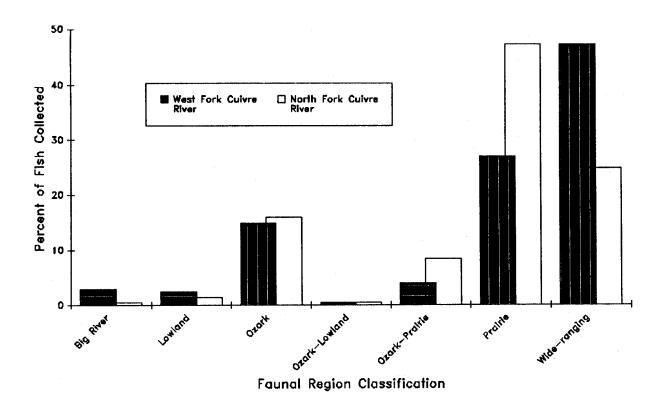


Figure 15. Relative abundance of fish collected from the West Fork Cuivre River and North Fork Cuivre River drainages, 1971 to 1991.